EMCAL Project Status

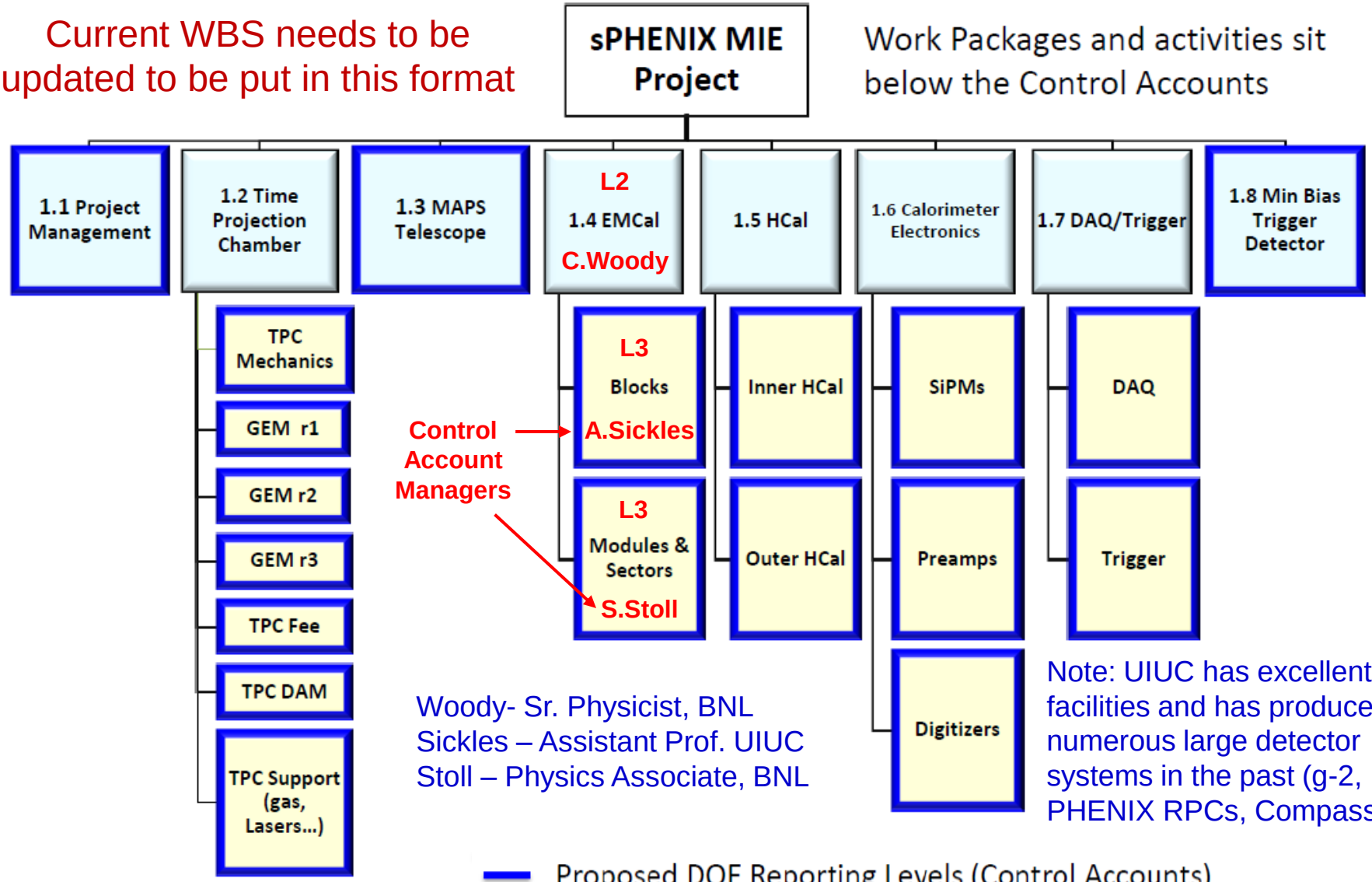
Craig Woody

sPHENIX Project Workfest

March 1, 2017

Level 2 Manager and CAMs

Current WBS needs to be updated to be put in this format



Woody- Sr. Physicist, BNL
Sickles – Assistant Prof. UIUC
Stoll – Physics Associate, BNL

Note: UIUC has excellent facilities and has produced numerous large detector systems in the past (g-2, PHENIX RPCs, Compass ..)

Status of the EMCAL Project Files

- A complete new Project File had been created with the new Control Account and WBS structure.
- A time schedule has been implemented with a milestone completion date of 11/4/20 for the completion and readiness for installation of all sectors.
- A schedule has been implemented for the start of final module production of 2/4/19 at UIUC. This leads to the completion of all sectors at BNL by 10/30/20. There is currently no float in this schedule and assumes all labor at BNL is available when needed.
- The current total cost for the EMCAL subsystem is $6.029M (without contingency), which includes the cost of materials and labor at UIUC, and some, but not all, of the materials costs at BNL, and assumes all BNL labor comes at no cost. This also assumes some free student labor from some of our collaborators

Changes in the design

- Based on the results of our test of the v2 prototype at Fermilab, we want to change the design in order to make the blocks slightly non-projective in η and ϕ. This is to eliminate a high degree of non-uniformity in the current design that we measured in the beam test.
- Based on recent discussions, this does not appear to be a major change in the mechanical design. We hope to have a updated design with the next few weeks. However, we need a full time mechanical engineer working on this project if we are going to keep to our schedule.
- We have added the construction of a new v2.1 prototype that would be built this year and possibly tested at Fermilab late this year or early next year. This may eliminate the need for a beam test of the preproduction prototype

Schedule and Milestones

V2 prototype complete	3/31/17
V2.1 prototype complete	10/31/17 ?
Preproduction complete	7/2/18
Start final block fabrication	2/4/19
Final Block/Module production complete	10/2/20
EMCal full assembly, ready to install	10/29/20
Begin Installation of EMCal	11/4/20
Operations Readiness review	12/29/20
Start Commission EMCal	4/15/21

Basis of Cost Estimates

We have some BOE's that carry over from our previous WBS, but these need to be updated for the current WBS

- We've received material cost and labor estimates from UIUC, but no substantiatiing documentation.
- We're currently working on material cost and labor estimates for BNL.

PHENIX	**sPHENIX Detector** **Relativistic Heavy Ion Collider** **BASIS of ESTIMATE (BoE)**	**Date of Est:** 10/28/15 **Prepared by:** Craig Woody **DocNo. (refer Rev. Log):**

WBS number: 1.2.2.1.8 **WBS Title: Fabricate modules**

WBS Dictionary Definition:
Fabricate all absorber blocks for entire EMCAL

Estimate Type (check all that apply):

___ Work Complete
___ Existing Purchase Order
___ Catalog Listing or Industrial Construction Database
___ Documented Vendor Quotation based on Drawings/ Sketches/ Specifications
_X_ Budgetary Estimate by Vendor/Fabricator based on Sketches, Drawings, or other Written Correspondenc
___ Engineering Estimate based on Similar Items or Procedures
___ Engineering Estimate based on Analysis
___ Expert Opinion

Supporting Documents (including but not limited to):

Budgetary quote and engineering drawing of prototype block attached.

Details of the Base Estimate (explanation of the Work)

This BOE covers the cost of construction of all the absorber blocks for the complete EMCAL. This estimate is based on a budgetary quote from Tungsten Heavy Powder for fabricating 12,500 blocks according to the prototype drawing we supplied to them. The prototype blocks are 1x2 tower modules, but the final blocks may be a different configuration. In either case, the total number of absorber blocks would correspond to the 25,00(towers required for the entire calorimeter. The cost includes labor but not the scintillating fiber which we must supply separately.

Assumptions Used in Developing Estimate:

The cost was based on the drawing for the prototype blocks which are 1x2 towers and are 1D projective. The final EMCAL design may be 2D projective which would increase the cost. The final design may also be with blocks that are not 1x2 towers. This could also affect the cost.

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Risk Analysis

RISK	Rank	Mitigation Plan
Loss of W powder supplier	Low	Find another source of W powder which can meet our specs. Some have already been investigated. Attempt to identify primary source of raw powder in China and identify new distributor
Loss of SciFi supplier	Moderate	Two suppliers have been identified. We believe both can meet our specs, but one is roughly 2x high cost. If lower priced supplier cannot deliver then we must use contingency to purchase from other supplier
Loss of primary production site for blocks (UIUC)	Low	Blocks would have to be built at BNL. However, we would loose scientific oversight provided by UIUC, student labor, free use of facilities, space, etc
Cannot find cost effective solution for making light guides	Moderate	We are investigating both injection molding and casting of light guides. Several companies have been identified. Injection molding has been shown to produce encouraging results but with low yield.

Need to produce actual Risk Registry